

CLAIMS

What is claimed is:

1 1. A circuit that is coupled to a transducer that can
2 drive a cutting element, wherein the transducer has a
3 natural frequency and can operate in a resonant mode,
4 comprising:

5 a control circuit adapted to provide a driving signal
6 to the transducer, said driving signal including a
7 plurality of pulses provided in a time duration that does
8 not induce the transducer to operate in the resonant mode.

1 2. The circuit of claim 1, wherein said pulses are
2 provided in a plurality of packets that are separated by
3 pauses.

1 3. The circuit of claim 1, wherein said pulses have a
2 frequency approximately at the natural frequency of the
3 cutting element.

1 4. The circuit of claim 2, wherein each packet has a
2 time duration between 0.5 and 5 milliseconds.

1 5. The circuit of claim 2, wherein each pause has a
2 time duration that prevents a generation of a significant
3 amount of heat by the cutting element.

1 ~~6. A tissue cutting device, comprising:~~
2 ~~a cutting element;~~
3 ~~a transducer that moves said cutting element, said~~
4 ~~transducer having a natural frequency and can operate in a~~
5 ~~resonant mode;~~
6 ~~a control circuit that provides a driving signal to~~
7 ~~said transducer, said driving signal including a plurality~~
8 ~~of pulses provided in a time duration that does not induce~~
9 ~~said transducer to operate in the resonant mode.~~

1 7. The device of claim 6, wherein said pulses are
2 provided in a plurality of packets that are separated by
3 pauses.

1 8. The device of claim 6, wherein said pulses have a
2 frequency approximately at the natural frequency of the
3 driving element.

1 9. The device of claim 7, wherein each packet has a
2 time duration between 0.5 and 5 milliseconds.

1 10. The device of claim 6, wherein the resonant mode
2 is in an ultrasonic frequency range.

1 11. The device of claim 6, wherein said cutting
2 element is a tip.

1 12. The device of claim 7, wherein each pause has a
2 time duration that prevents a generation of a significant
3 amount of heat by the cutting element.

1 ~~13.~~ A method for driving transducer that moves a
2 cutting element, wherein the transducer has a natural
3 frequency and can operate in a resonant mode, comprising:
4 transmitting a driving signal to the transducer, said
5 driving signal including a plurality of pulses provided in
6 a time duration that does not induce said transducer to
7 operate in the resonant mode.

1 14. The method of claim 13, wherein the pulses are
2 provided in a plurality of packets each separated by a
3 pause.

1 15. The method of claim 14, wherein the pulses are at
2 a frequency at approximately the natural frequency of the
3 transducer.

1 16. The method of claim 14, wherein each pause is of a
2 duration to prevent a significant generation of heat by the
3 cutting element.

See 17-28
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